**Key points**

* Because X¯ is the sum of random draws divided by a constant, the distribution of X¯ is approximately normal.
* We can convert X¯ to a standard normal random variable Z:

Z=X¯−E(X¯)SE(X¯)

* The probability that X¯ is within .01 of the actual value of p is:

Pr(Z≤.01/√p(1−p)/N) − Pr(Z≤−.01/√p(1−p)/N)

* The Central Limit Theorem (CLT) still works if X¯ is used in place of p. This is called a *plug-in estimate*. Hats over values denote estimates. Therefore:

SE^(X¯)= √X¯(1−X¯)/N

Using the CLT, the probability that X¯ is within .01 of the actual value of p is:

Pr(Z≤.01/ √X¯(1−X¯)/N)−Pr(Z≤−.01/ √X¯(1−X¯)/N)

**Code: Computing the probability of**X¯**being within .01 of**p

X\_hat <- 0.48

se <- sqrt(X\_hat\*(1-X\_hat)/25)

pnorm(0.01/se) - pnorm(-0.01/se)